

We Claim:

- 1) A method for increasing the dynamic range of a mass spectrometer having at least one quadrupole ion filter and one mass analyzer, comprising the steps of:
 - a. passing a first sample of ions through the quadrupole ion filter and the mass analyzer;
 - b. measuring the intensities of the mass spectrum of said first sample;
 - c. identifying undesired ions within said first sample for ejection;
 - d. introducing a second sample of ions into the mass spectrometer;
 - e. applying the appropriate rf voltages to the quadrupole ion filter to eject the undesired ions;
 - and
 - f. detecting the mass spectrum of the desired ions in the mass analyzer.
- 2) The method of claim 1 comprising the further step of accumulating the desired ions in a ion trap interposed between the quadrupole ion filter and the mass analyzer.
- 3) The method of claim 1 wherein detecting the mass spectrum of the desired ions is performed in a mass analyzer selected from the group consisting of an ion trap mass spectrometer and a Fourier transform ion cyclotron resonance mass spectrometer.
- 4) The method of claim 2 wherein detecting the mass spectrum of the desired ions is performed in a mass analyzer selected from the group consisting of an ion trap mass spectrometer and a Fourier transform ion cyclotron resonance mass spectrometer.
- 5) The method of claim 1 wherein the ejection of the undesired ions is accomplished by applying resonant rf-only voltages to the quadrupole ion filter selected from the group consisting of dipolar excitation, quadrupolar excitation, and parametric excitation.
- 6) The method of claim 2 wherein the ejection of the undesired ions is accomplished by applying resonant rf-only voltages to the quadrupole ion filter from the group consisting of dipolar excitation, quadrupolar excitation, and parametric excitation.

7) The method of claim 1 wherein steps a-f are repeated to detect further undesired ions for ejection.

8) A method for increasing the dynamic range of a mass spectrometer having at least one quadrupole ion filter, an ion trap and a mass analyzer, comprising the steps of:

- a. passing a first sample of ions through the quadrupole ion filter and the mass analyzer;
- b. measuring the intensities of the mass spectrum of said first sample;
- c. identifying undesired ions within said first sample for ejection;
- d. introducing a second sample of ions into the mass spectrometer;
- e. applying the appropriate rf voltages to the quadrupole ion filter to eject the undesired ions;
- f. accumulating desired ions in the ion trap,
- g. transferring the desired ions from the ion trap to the mass analyzer, and
- h. detecting the mass spectrum of the desired ions in the mass analyzer.

9) The method of claim 8 wherein detecting the mass spectrum of the desired ions is performed in a mass analyzer selected from the group consisting of an ion trap mass spectrometer and a Fourier transform ion cyclotron resonance mass spectrometer.

10) The method of claim 8 wherein the ejection of the undesired ions is accomplished by applying resonant rf-only voltages to the quadrupole ion filter selected from the group consisting of dipolar excitation, quadrupolar excitation, and parametric excitation.

11) The method of claim 8 wherein steps a-h are repeated to detect further undesired ions for ejection.